



SEQUENCE LISTING

<110> Marks, James D  
Amersdorfer, Peter

<120> Therapeutic Monoclonal Antibodies That Neutralize  
Botulinum Neurotoxins

<130> 2500.117USO

<140> US 09/144,986

<141> 1998-08-31

<160> 98

<170> PatentIn Ver. 2.0

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linker

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1 5 10 15

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<211> 5

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linker

<400> 2

Ser Ser Ser Ser Gly  
1 5

<210> 3

<211> 15

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<223> Description of Artificial Sequence: [(Ser)4Gly]3  
linker

<400> 3

Ser Ser Ser Ser Gly Ser Ser Ser Ser Gly Ser Ser Ser Ser Gly  
1 5 10 15

<210> 4

<211> 5

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 Gly Gly Gly Gly Ser  
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 His His His His His His  
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 accaccgaat tcttattaat ggtgatgatg gtggatgacc agccggttcc agcgg       55  
  
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           chain constant region MlgG1/2 For primer  
  
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 ctggacaggg atccagagtt cca                               23  
  
 <210> 8  
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 ctggacaggg ctccatagtt c                               21  
  
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<211> 24  
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           region MCKappa For primer  
  
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 ctcattcctg ttgaagctct tgac 24  
  
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 <223> Description of Artificial Sequence: mouse VH1 back  
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 gaggtgcagc ttcaggagtc agg 23  
  
 <210> 11  
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           primer  
  
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 gatgtgcagc ttcaggagtc rgg 23  
  
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         primer  
  
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 gargtgaagc tgggtggartc tgg 23  
  
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 <400> 16  
 gaggttcagc ttcagcagtc tgg 23  
  
 <210> 17  
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         back primer  
  
 <400> 17  
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 <210> 18  
 <211> 23  
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 <210> 19  
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<213> Artificial Sequence

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<223> Description of Artificial Sequence: mouse VH1 back primer 2

<400> 19

gacattgtga tgwcacagtc tcc

23

<210> 20

<211> 23

<212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence: mouse VH2 Back primer 2

<400> 20

gatgttktga tgacccaaac tcc

23

<210> 21

<211> 23

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: mouse VH3 back primer 2

<400> 21

gatattgtga tracbcaggc wgc

23

<210> 22

<211> 23

<212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence: mouse VH4 back primer 2

<400> 22

gacattgtgc tgacmcartc tcc

23

<210> 23

<211> 23

<212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence: mouse VH5 back primer 2

<400> 23

saaawtgtkc tcacccagtc tcc

23

<210> 24

<211> 23

<212> DNA

<213> Artificial Sequence

<220>  
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     primer 2  
  
 <400> 24  
 gayatyvwga tgacmcagwc tcc 23  
  
 <210> 25  
 <211> 23  
 <212> DNA  
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 <223> Description of Artificial Sequence: mouse VH7 back  
     primer 2  
  
 <400> 25  
 caaattgttc tcacccagtc tcc 23  
  
 <210> 26  
 <211> 23  
 <212> DNA  
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 <220>  
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     primer 2  
  
 <400> 26  
 tcattattgc aggtgcttgt ggg 23  
  
 <210> 27  
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 <212> DNA  
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     primer  
  
 <400> 27  
 tgaggagacg gtgaccgtgg tccc 24  
  
 <210> 28  
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     primer  
  
 <400> 28  
 tgaggagact gtgagagtgg tgcc 24  
  
 <210> 29  
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 <212> DNA  
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<220>  
 <223> Description of Artificial Sequence: mouse JH3 For  
       primer  
  
 <400> 29  
 tgcagagaca gtgaccagag tccc 24  
  
 <210> 30  
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 <213> Artificial Sequence  
  
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 <223> Description of Artificial Sequence: mouse JH4 For  
       primer  
  
 <400> 30  
 tgaggagacg gtgactgagg ttcc 24  
  
 <210> 31  
 <211> 24  
 <212> DNA  
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 <220>  
 <223> Description of Artificial Sequence: mouse JK1 For  
       primer  
  
 <400> 31  
 tttgatttcc agcttggtgc ctcc 24  
  
 <210> 32  
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       primer  
  
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       primer  
  
 <400> 33  
 ttttatttcc agtctggtcc catc 24  
  
 <210> 34  
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<223> Description of Artificial Sequence: mouse JK4 For primer

<400> 34  
 ttttatttcc aactttgtcc ccga 24

<210> 35  
 <211> 24  
 <212> DNA  
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<220>  
 <223> Description of Artificial Sequence: mouse JK5 For primer

<400> 35  
 tttcagctcc agcttggtcc cagc 24

<210> 36  
 <211> 56  
 <212> DNA  
 <213> Artificial Sequence

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 <223> Description of Artificial Sequence: mouse VH1 Sfi back primer

<400> 36  
 gtccctcgcaa ctgcggccca gccggccatg gccgaggtgc agcttcagga gtcagg 56

<210> 37  
 <211> 56  
 <212> DNA  
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<220>  
 <223> Description of Artificial Sequence: mouse VH2 Sfi back primer

<400> 37  
 gtccctcgcaa ctgcggccca gccggccatg gccgatgtgc agcttcagga gtcrgg 56

<210> 38  
 <211> 56  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: mouse VH3 Sfi back primer

<400> 38  
 gtccctcgcaa ctgcggccca gccggccatg gccaggtgc agctgaagsa gtcagg 56

<210> 39  
 <211> 56  
 <212> DNA  
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<220>  
 <223> Description of Artificial Sequence: mouse VH4/6



Sfi back primer

<400> 39  
gtcctcgcaa ctgcgggccca gccggccatg gccgaggtgc agctgcarca rtctgg 56

<210> 40  
<211> 56  
<212> DNA  
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<223> Description of Artificial Sequence: mouse VH5/9  
Sfi back primer

<400> 40  
gtcctcgcaa ctgcgggccca gccggccatg gccaggtgc arctgcagca gyctgg 56

<210> 41  
<211> 56  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: mouse VH7 Sfi  
back primer

<400> 41  
gtcctcgcaa ctgcgggccca gccggccatg gccgargtga agctggtgga rtctgg 56

<210> 42  
<211> 56  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: mouse VH8 Sfi  
back primer

<400> 42  
gtcctcgcaa ctgcgggccca gccggccatg gccgaggttc agcttcagca gtctgg 56

<210> 43  
<211> 56  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: mouse VH10 Sfi  
back primer

<400> 43  
gtcctcgcaa ctgcgggccca gccggccatg gccgaagtgc agctgktgga gwctgg 56

<210> 44  
<211> 56  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: mouse VH11 Sfi  
back primer

<400> 44  
 gtcctcgcaa ctgcggccca gccggccatg gccagatcc agttgctgca gtctgg 56  
  
 <210> 45  
 <211> 48  
 <212> DNA  
 <213> Artificial Sequence  
  
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 <223> Description of Artificial Sequence: mouse Jkappa1  
 Not forward primer  
  
 <400> 45  
 gagtcattct cgacttgccg ccgctttgat ttccagcttg gtgcctcc 48  
  
 <210> 46  
 <211> 48  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> Description of Artificial Sequence: mouse Jkappa2  
 Not forward primer  
  
 <400> 46  
 gagtcattct cgacttgccg ccgcttttat ttccagcttg gtccccc 48  
  
 <210> 47  
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 <212> DNA  
 <213> Artificial Sequence  
  
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 <223> Description of Artificial Sequence: mouse Jkappa3  
 Not forward primer  
  
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 gagtcattct cgacttgccg ccgcttttat ttccagtctg gtcccatc 48  
  
 <210> 48  
 <211> 48  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> Description of Artificial Sequence: mouse Jkappa4  
 Not forward primer  
  
 <400> 48  
 gagtcattct cgacttgccg ccgcttttat ttccaacttt gtccccga 48  
  
 <210> 49  
 <211> 48  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> Description of Artificial Sequence: mouse Jkappa5  
 Not forward primer

<400> 49  
gagtcattct cgacttgccg cgcctttcag ctccagcttg gtcccagc 48

<210> 50  
<211> 7  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Gly4Ser3  
linker

<400> 50  
Gly Gly Gly Gly Ser Ser Ser  
1 5

<210> 51  
<211> 125  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: BONT/A clone  
C15 region VH epitope 1

<400> 51  
Gln Val Lys Leu Gln Gln Ser Gly Ala Glu Leu Val Arg Pro Gly Ala  
1 5 10 15  
Ser Val Lys Leu Ser Cys Lys Thr Ser Gly Tyr Ser Phe Thr Ser Tyr  
20 25 30  
Trp Met Asn Trp Val Lys Gln Gly Pro Gly Gln Gly Leu Glu Trp Ile  
35 40 45  
Gly Met Ile His Pro Ser Asn Ser Glu Ile Arg Phe Asn Gln Lys Phe  
50 55 60  
Glu Asp Met Ala Thr Leu Thr Val Asp Lys Ser Ser Ser Thr Ala Tyr  
65 70 75 80  
Met Gln Leu Ser Ser Pro Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys  
85 90 95  
Ala Arg Gly Ile Tyr Tyr Asp Tyr Asp Gly Gly Asn Tyr Tyr Ala Met  
100 105 110  
Asp Tyr Trp Gly Gln Gly Thr Thr Val Thr Ala Ser Ser  
115 120 125

<210> 52  
<211> 125  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: BONT/A clone  
C9 region VH epitope 1

<400> 52

Gln Val Lys Leu Gln Gln Ser Gly Ala Glu Leu Val Arg Pro Gly Ala  
1 5 10 15

Ser Val Lys Leu Ser Cys Lys Thr Ser Gly Tyr Ser Phe Thr Ser Tyr  
20 25 30

Trp Met Asn Trp Val Lys Gln Gly Pro Gly Gln Gly Leu Glu Trp Ile  
35 40 45

Gly Met Ile His Pro Ser Asn Ser Glu Ile Arg Phe Asn Gln Lys Phe  
50 55 60

Glu Asn Met Ala Thr Leu Thr Val Asp Lys Ser Ser Ser Thr Ala Tyr  
65 70 75 80

Met Gln Leu Ser Ser Pro Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys  
85 90 95

Ala Arg Gly Ile Tyr Tyr Val Tyr Asp Gly Gly Asn Tyr Tyr Ala Met  
100 105 110

Asp Tyr Trp Gly Gln Gly Thr Thr Val Thr Val Ser Ser  
115 120 125

<210> 53

<211> 125

<212> PRT

<213> Artificial Sequence

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<223> Description of Artificial Sequence: BoNT/A clone  
1D5 region VH epitope 1

<400> 53

Glu Val Lys Leu Val Glu Ser Gly Ala Glu Leu Val Arg Pro Gly Ala  
1 5 10 15

Ser Val Asn Leu Ser Cys Lys Ala Ser Gly Tyr Ser Phe Thr Ser Tyr  
20 25 30

Trp Met Asn Trp Val Lys Gln Arg Pro Gly Gln Gly Leu Glu Trp Ile  
35 40 45

Gly Met Ile His Pro Ser Asn Ser Glu Thr Arg Leu Asn Gln Lys Phe  
50 55 60

Lys Asp Lys Ala Thr Leu Thr Val Asp Lys Ser Ser Ser Thr Ala Tyr  
65 70 75 80

Met Gln Leu Ser Ser Pro Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys  
85 90 95

Ala Arg Gly Ile Tyr Tyr Asp Tyr Asp Glu Gly Tyr Tyr Tyr Thr Leu  
100 105 110

Asp Tyr Trp Gly Gln Gly Thr Thr Leu Thr Val Ser Ser  
115 120 125

<210> 54  
 <211> 121  
 <212> PRT  
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<220>  
 <223> Description of Artificial Sequence: BoNT/A clone  
 C1 region VH epitope 1

<400> 54  
 Gln Val Lys Leu Gln Gln Ser Gly Ala Glu Leu Val Arg Pro Gly Ala  
     1                    5                    10                    15  
 Ser Val Lys Leu Ser Cys Lys Ala Ser Gly Tyr Ser Phe Thr Ser Tyr  
             20                    25                    30  
 Trp Met Asn Trp Val Lys Gln Arg Pro Gly Gln Gly Leu Glu Trp Ile  
             35                    40                    45  
 Gly Met Ile His Pro Ser Asn Ser Asp Thr Arg Phe Asn Gln Lys Phe  
             50                    55                    60  
 Glu Asp Lys Ala Thr Leu Thr Val Asp Arg Ser Ser Ser Thr Ala Ile  
             65                    70                    75                    80  
 His Gln Leu Ser Ser Pro Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys  
                     85                    90                    95  
 Ala Arg Gly Leu Tyr Gly Tyr Gly Phe Trp Tyr Phe Asp Val Trp Gly  
             100                    105                    110  
 Gln Gly Thr Thr Val Thr Val Ser Ser  
             115                    120

<210> 55  
 <211> 120  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: BoNT/A clone  
 S25 region VH epitope 1

<400> 55  
 Gln Val Lys Leu Gln Gln Ser Gly Ala Glu Leu Val Arg Pro Gly Ala  
     1                    5                    10                    15  
 Ser Val Lys Leu Ser Cys Lys Ala Ser Gly Tyr Ser Leu Thr Ser Tyr  
             20                    25                    30  
 Trp Met Asn Trp Val Lys Gln Arg Pro Gly Gln Gly Leu Glu Trp Ile  
             35                    40                    45  
 Gly Met Ile His Pro Ser Asp Ser Asp Thr Arg Phe Asn Gln Lys Phe  
             50                    55                    60  
 Glu Asp Lys Ala Thr Leu Thr Val Asp Thr Ser Ser Ser Thr Ala Tyr  
             65                    70                    75                    80  
 Met Gln Leu Ser Ser Pro Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys

85

90

95

Ala Arg Gly Leu Tyr Asn Gly Phe Trp Tyr Phe Asp Val Trp Gly Gln  
 100 105 110

Gly Thr Thr Val Thr Val Ser Ser  
 115 120

&lt;210&gt; 56

&lt;211&gt; 117

&lt;212&gt; PRT

&lt;213&gt; Artificial Sequence

&lt;220&gt;

<223> Description of Artificial Sequence: BoNT/A clone  
 1B6 region VH epitope 1

&lt;400&gt; 56

Gln Val Gln Leu Gln Gln Ser Gly Ala Glu Leu Val Arg Pro Gly Val  
 1 5 10 15

Ser Val Lys Ile Ser Cys Lys Ala Ser Gly Tyr Thr Phe Ile Asp Tyr  
 20 25 30

Ala Met His Trp Val Lys Gln Ser Pro Ala Lys Ser Leu Glu Trp Ile  
 35 40 45

Gly Val Ile Ser Ser Tyr Tyr Gly Asp Thr Asp Tyr Asn Gln Ile Phe  
 50 55 60

Lys Gly Lys Ala Thr Leu Thr Val Asp Lys Ser Ser Asn Thr Ala Tyr  
 65 70 75 80

Met Glu Leu Ala Arg Leu Thr Ser Asp Asp Ser Ala Ile Tyr Tyr Cys  
 85 90 95

Ala Arg Arg Gly Lys Gly Ala Met Asp Tyr Trp Gly Gln Gly Thr Thr  
 100 105 110

Val Thr Val Ser Ser  
 115

&lt;210&gt; 57

&lt;211&gt; 117

&lt;212&gt; PRT

&lt;213&gt; Artificial Sequence

&lt;220&gt;

<223> Description of Artificial Sequence: BoNT/A clone  
 1C9 region VH epitope 1

&lt;400&gt; 57

Gln Val Gln Leu Lys Gln Ser Gly Ala Glu Leu Val Arg Pro Gly Val  
 1 5 10 15

Ser Val Lys Ile Ser Cys Lys Gly Ser Gly Tyr Thr Phe Ile Asp Tyr  
 20 25 30

Ala Val His Trp Val Lys Gln Ser His Ala Lys Ser Leu Glu Trp Ile

35							40					45				
Gly	Val	Ile	Ser	Thr	Tyr	Tyr	Gly	Asp	Ala	Asp	Tyr	Asn	Pro	Lys	Phe	
	50					55					60					
Lys	Gly	Lys	Ala	Thr	Leu	Thr	Val	Asn	Lys	Ser	Ser	Asn	Thr	Ala	Tyr	
65					70					75					80	
Met	Glu	Leu	Pro	Arg	Leu	Thr	Ser	Glu	Asp	Ser	Ala	Ile	Tyr	Tyr	Cys	
				85					90					95		
Ala	Arg	Arg	Gly	Lys	Gly	Ala	Met	Asp	Tyr	Trp	Gly	Gln	Gly	Thr	Ser	
			100					105					110			
Val	Thr	Val	Ser	Ser												
		115														

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<210> 59
<211> 115
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: BoNT/A clone
      1G7 region VH epitope 1
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<400> 59

Glu Val Gln Leu Gln Glu Ser Gly Pro Gly Leu Val Lys Pro Ser Gln  
1 5 10 15

Ser Leu Ser Leu Thr Cys Thr Val Thr Gly Tyr Ser Ile Thr Asp Tyr  
20 25 30

Ala Trp Tyr Trp Ile Arg Gln Phe Pro Gly Lys Lys Leu Glu Trp Met  
35 40 45

Gly Tyr Ile Ser Tyr Ser Gly Ser Thr Gly Tyr Asn Pro Ser Leu Lys  
50 55 60

Ser Arg Ile Ser Ile Thr Arg Asp Thr Ser Lys Asn Gln Phe Phe Leu  
65 70 75 80

Gln Leu Asn Ser Val Thr Thr Glu Asp Thr Gly Thr Tyr Tyr Cys Ala  
85 90 95

Arg Gly Tyr Asp Ala Met Asp Tyr Trp Gly Gln Gly Thr Ser Val Thr  
100 105 110

Val Ser Ser  
115

<210> 60

<211> 123

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: BoNT/A clone  
1A1 region VH epitope 2

<400> 60

Glu Val Lys Leu Val Glu Ser Gly Gly Gly Leu Val Gln Pro Gly Gly  
1 5 10 15

Ser Arg Lys Leu Ser Cys Ala Thr Ser Gly Phe Thr Phe Ser Asp Tyr  
20 25 30

Tyr Met Ser Trp Ile Arg Gln Ser Pro Asp Lys Arg Leu Glu Trp Val  
35 40 45

Ala Thr Ile Ser Asp Gly Gly Thr Tyr Thr Tyr Tyr Pro Asp Ser Val  
50 55 60

Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ala Lys Asn Thr Leu Tyr  
65 70 75 80

Leu Gln Met Ser Ser Leu Lys Ser Glu Asp Thr Ala Met Tyr Tyr Cys  
85 90 95

Val Arg His Gly Tyr Gly Asn Tyr Pro Ser His Trp Tyr Phe Asp Val  
100 105 110

Trp Gly Ala Gly Thr Thr Val Thr Val Ser Ser  
115 120



<210> 61  
 <211> 123  
 <212> PRT  
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<220>  
 <223> Description of Artificial Sequence: BoNT/A clone  
 1F1 region VH epitope 2

<400> 61  
 Glu Val Lys Leu Val Glu Ser Gly Gly Gly Leu Val Gln Pro Gly Gly  
   1                  5                  10                  15  
 Ser Leu Lys Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Ser Asn Tyr  
                   20                  25                  30  
 Gly Met Ser Trp Val Arg Gln Thr Pro Asp Lys Arg Leu Glu Trp Val  
           35                  40                  45  
 Ala Met Ile Ser Ser Gly Gly Ser Tyr Asn Tyr Tyr Ser Asp Ser Val  
   50                  55                  60  
 Lys Gly Arg Val Thr Ile Ser Arg Asp Asn Ala Lys Ser Thr Leu Tyr  
   65                  70                  75                  80  
 Leu Gln Met Ser Ser Leu Gln Ser Glu Asp Thr Ala Met Tyr Leu Cys  
                   85                  90                  95  
 Thr Arg His Gly Tyr Gly Asn Tyr Pro Ser Tyr Trp Tyr Phe Asp Val  
           100                  105                  110  
 Trp Gly Ala Gly Thr Thr Val Thr Val Ser Ser  
   115                  120

<210> 62  
 <211> 118  
 <212> PRT  
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 <223> Description of Artificial Sequence: BoNT/A clone  
 C39 region VH epitope 2

<400> 62  
 Gln Val Gln Leu Gln Glu Ser Gly Gly Gly Ser Val Lys Pro Gly Gly  
   1                  5                  10                  15  
 Ser Leu Lys Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Ser Asp Tyr  
                   20                  25                  30  
 Tyr Met Ser Trp Val Arg Gln Thr Pro Glu Lys Arg Leu Glu Trp Val  
           35                  40                  45  
 Ala Thr Ile Ser Asp Gly Gly Ser Tyr Thr Tyr Tyr Pro Asp Ser Val  
   50                  55                  60  
 Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ala Lys Asn Asn Leu Tyr  
   65                  70                  75                  80

Leu Gln Met Ser Ser Leu Lys Ser Glu Asp Thr Ala Ile Tyr Tyr Cys  
85 90 95

Val Arg Tyr Arg Tyr Asp Glu Gly Leu Asp Tyr Trp Gly Gln Gly Thr  
100 105 110

Thr Val Thr Val Ser Ser  
115

<210> 63  
<211> 118  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: BoNT/A clone  
C25 region VH epitope 2

<400> 63  
Gln Val Gln Leu Gln Glu Ser Gly Gly Gly Leu Val Lys Pro Gly Gly  
1 5 10 15

Ser Leu Lys Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Ser Asp Tyr  
20 25 30

Tyr Met Tyr Trp Val Arg Gln Thr Pro Glu Lys Arg Leu Glu Trp Val  
35 40 45

Ala Thr Ile Ser Asp Gly Gly Ser Tyr Thr Tyr Tyr Pro Asp Ser Val  
50 55 60

Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ala Lys Asn Asn Leu Tyr  
65 70 75 80

Leu Gln Met Ser Ser Leu Lys Ser Glu Asp Thr Ala Met Tyr Tyr Cys  
85 90 95

Ser Arg Tyr Arg Tyr Asp Asp Ala Met Asp Tyr Trp Gly Gln Gly Thr  
100 105 110

Thr Val Thr Val Ser Ser  
115

<210> 64  
<211> 118  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: BoNT/A clone  
2G5 region VH epitope 2

<400> 64  
Glu Val Lys Leu Val Glu Ser Gly Gly Gly Leu Val Lys Pro Gly Gly  
1 5 10 15

Ser Leu Lys Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Ser Ser Tyr  
20 25 30

Ala Met Ser Trp Val Arg Gln Thr Pro Glu Lys Arg Leu Glu Trp Val  
35 40 45

Ala Thr Ile Ser Asp Gly Gly Thr Tyr Thr Tyr Thr Asp Asn Val  
50 55 60

Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ala Lys His Asn Leu Tyr  
65 70 75 80

Leu Gln Met Ser His Leu Lys Ser Glu Asp Thr Ala Met Tyr Tyr Cys  
85 90 95

Ala Arg Asn Leu Pro Tyr Asp His Val Asp Tyr Trp Gly Gln Gly Thr  
100 105 110

Ser Val Thr Val Ser Ser  
115

<210> 65  
<211> 118  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: BoNT/A clone  
3C3 region VH epitope 2

<400> 65  
Glu Val Lys Leu Lys Glu Ser Gly Gly Gly Leu Val Lys Pro Gly Gly  
1 5 10 15

Ser Leu Lys Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Ser Ser Tyr  
20 25 30

Ala Met Ser Trp Val Arg Gln Thr Pro Glu Lys Arg Leu Glu Trp Val  
35 40 45

Ala Thr Ile Ser Asp Gly Gly Thr Tyr Thr Tyr Thr Asp Asn Val  
50 55 60

Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ala Lys His Asn Leu Tyr  
65 70 75 80

Leu Gln Met Ser His Leu Lys Ser Glu Asp Thr Ala Met Tyr Tyr Cys  
85 90 95

Ala Arg Asn Leu Pro Tyr Asp His Val Asp Tyr Trp Gly Gln Gly Thr  
100 105 110

Ser Val Thr Val Ser Ser  
115

<210> 66  
<211> 118  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: BoNT/A clone

# 3F4 region VH epitope 2

<400> 66

```

Glu Gly Lys Leu Val Glu Ser Gly Gly Gly Leu Val Lys Pro Gly Gly
 1           5           10           15
Ser Leu Lys Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Ser Ser Tyr
          20           25           30
Ala Met Ser Trp Val Arg Gln Thr Pro Glu His Arg Leu Glu Trp Val
          35           40           45
Ala Thr Ile Ser Asp Gly Gly Thr Phe Thr Tyr Tyr Thr Asp Asn Val
          50           55           60
Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ala Lys His Asn Leu Tyr
          65           70           75           80
Leu Gln Met Ser His Leu Lys Ser Glu Asp Thr Ala Met Tyr Tyr Cys
          85           90           95
Ala Arg Asn Leu Pro Tyr Asp His Val Asp Tyr Trp Gly Gln Gly Thr
          100          105          110
Ser Val Thr Val Ser Ser
          115

```

<210> 67

<211> 118

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: BoNT/A clone  
3H4 region VH epitope 2

<400> 67

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Glu Val Lys Leu Val Glu Ser Gly Gly Gly Leu Val Lys Pro Gly Gly
 1           5           10           15
Pro Leu Lys Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Ser Ser Tyr
          20           25           30
Ala Met Ser Trp Val Arg Gln Thr Pro Glu His Arg Leu Glu Trp Val
          35           40           45
Ala Thr Ile Ser Asp Gly Gly Thr Phe Thr Tyr Tyr Thr Asp Asn Val
          50           55           60
Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ala Lys His Asn Leu Tyr
          65           70           75           80
Leu Gln Met Ser His Leu Lys Ser Glu Asp Thr Ala Met Tyr Tyr Cys
          85           90           95
Ala Arg Asn Leu Pro Tyr Asp His Val Asp Tyr Trp Gly Gln Gly Thr
          100          105          110
Ser Val Thr Val Ser Ser
          115

```

<210> 68  
 <211> 122  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: BoNT/A clone  
 1B3 region VH epitope 3

<400> 68  
 Glu Val Gln Leu Gln Glu Ser Gly Gly Gly Val Val Gln Pro Gly Arg  
           1                  5                  10                  15  
 Ser Leu Arg Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Ser Ser Tyr  
                   20                  25                  30  
 Ala Met His Trp Val Arg Gln Ala Pro Gly Lys Gly Leu Glu Trp Val  
           35                  40                  45  
 Ala Val Ile Ser Tyr Asp Gly Ser Asn Lys Tyr Tyr Ala Asp Ser Val  
           50                  55                  60  
 Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ser Lys Asn Thr Leu Tyr  
           65                  70                  75                  80  
 Leu Gln Met Asn Ser Leu Arg Ala Glu Asp Thr Ala Val Tyr Tyr Cys  
                   85                  90                  95  
 Ala Arg Asp Trp Ser Glu Gly Tyr Tyr Tyr Tyr Gly Met Asp Val Trp  
           100                  105                  110  
 Gly Gln Gly Thr Thr Val Ile Val Ser Ser  
           115                  120

<210> 69  
 <211> 122  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: BoNT/A clone  
 1C6 region VH epitope 3

<400> 69  
 Gln Ile Gln Leu Leu Gln Ser Gly Gly Gly Val Val Gln Pro Gly Arg  
           1                  5                  10                  15  
 Ser Leu Arg Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Ser Ser Tyr  
                   20                  25                  30  
 Ala Met His Trp Val Arg Gln Ala Pro Gly Lys Gly Leu Glu Trp Val  
           35                  40                  45  
 Ala Val Ile Ser Tyr Asp Gly Ser Asn Lys Tyr Tyr Ala Asp Ser Val  
           50                  55                  60  
 Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ser Lys Asn Thr Leu Tyr  
           65                  70                  75                  80

Leu Gln Met Asn Ser Leu Arg Ala Glu Asp Thr Ala Val Tyr Tyr Cys  
85 90 95

Ala Arg Asp Trp Ser Glu Gly Tyr Tyr Tyr Tyr Gly Met Asp Val Trp  
100 105 110

Gly Gln Gly Thr Thr Val Ile Val Ser Ser  
115 120

<210> 70

<211> 121

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: BoNT/A clone  
2B6 region VH epitope 3

<400> 70

Val Lys Leu Val Glu Ser Gly Pro Gly Leu Val Lys Pro Ser Gln Ser  
1 5 10 15

Leu Ser Leu Thr Cys Thr Val Thr Gly Tyr Ser Ile Thr Ser Asp Tyr  
20 25 30

Ala Trp Asn Trp Ile Arg Gln Phe Pro Gly Asn Lys Leu Glu Trp Met  
35 40 45

Gly Tyr Ile Asn Tyr Asp Gly Ser Asn Asn Tyr Asn Pro Ser Leu Lys  
50 55 60

Asn Arg Ile Ser Ile Thr Arg Asp Thr Ser Lys Asn Gln Phe Phe Leu  
65 70 75 80

Lys Leu Asn Ser Val Thr Ser Glu Asp Thr Ala Thr Tyr Tyr Cys Ala  
85 90 95

Arg Ala Gly Asp Gly Tyr Tyr Val Asp Trp Tyr Phe Asp Val Trp Gly  
100 105 110

Thr Gly Thr Thr Val Ile Val Ser Ser  
115 120

<210> 71

<211> 117

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: BoNT/A clone  
1G5 region VH epitope 3

<400> 71

Gln Val Gln Leu Gln Gln Ser Gly Ala Glu Leu Val Gln Pro Gly Ala  
1 5 10 15

Ser Val Lys Met Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Ser Tyr  
20 25 30

Trp Thr Thr Trp Val Lys Gln Arg Pro Gly Gln Gly Leu Glu Trp Ile  
           35                          40                          45  
 Gly Asp Ile Tyr Pro Gly Ser Gly Ser Thr Asn Tyr Asn Glu Lys Phe  
           50                          55                          60  
 Lys Ser Lys Ala Thr Leu Thr Val Asp Thr Ser Ser Ser Thr Ala Tyr  
           65                          70                          75                          80  
 Met Gln Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys  
                           85                          90                          95  
 Ala Arg Glu Leu Gly Asp Ala Met Asp Tyr Trp Gly Gln Gly Thr Ser  
                           100                          105                          110  
 Val Ile Val Ser Ser  
           115

<210> 72  
 <211> 117  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: BoNT/A clone  
           1H6 region VH epitope 3

<400> 72  
 Glu Val Gln Leu Gln Gln Ser Gly Ala Glu Leu Val Lys Pro Gly Ala  
   1                          5                          10                          15  
 Ser Val Lys Met Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Ser Tyr  
           20                          25                          30  
 Trp Thr Thr Trp Val Lys Gln Arg Pro Gly Gln Gly Leu Glu Trp Ile  
           35                          40                          45  
 Gly Asp Ile Tyr Pro Asp Ser Gly Ser Thr Asn Tyr Asn Glu Lys Phe  
           50                          55                          60  
 Lys Ser Lys Ala Thr Leu Thr Val Asp Thr Ser Ser Ser Thr Ala Tyr  
           65                          70                          75                          80  
 Met Gln Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys  
                           85                          90                          95  
 Ala Arg Glu Leu Gly Asp Ala Met Asp Tyr Trp Gly Gln Gly Thr Ser  
                           100                          105                          110  
 Val Ile Val Ser Ser  
           115

<210> 73  
 <211> 119  
 <212> PRT  
 <213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: BoNT/A clone  
1F3 region VH epitope 4

<400> 73

```

Glu Val Gln Leu Gln Gln Ser Gly Ala Glu Leu Val Lys Pro Gly Ala
 1             5             10             15

Ser Val Lys Leu Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Ser Phe
          20             25             30

Trp Met His Trp Val Lys Gln Arg Pro Gly Arg Gly Leu Glu Trp Ile
          35             40             45

Gly Arg Leu Asp Pro Asn Ser Gly Glu Thr Lys Tyr Asn Glu Phe Lys
 50             55             60

Lys Ser Lys Ala Thr Leu Thr Val Asp Lys Pro Ser Ser Thr Ala Tyr
 65             70             75             80

Met Glu Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys
          85             90             95

Ala Arg Glu Ala Tyr Gly Tyr Trp Asn Phe Asp Val Trp Gly Thr Gly
          100             105             110

Thr Thr Val Thr Val Ser Ser
          115

```

<210> 74

<211> 119

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: BoNT/A clone  
2E8 region VH epitope 4

<400> 74

```

Glu Val Gln Leu Gln Gln Ser Gly Ala Glu Leu Val Lys Pro Gly Ala
 1             5             10             15

Ser Val Lys Leu Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Ser Phe
          20             25             30

Trp Met His Trp Val Lys Gln Arg Pro Gly Arg Gly Leu Glu Trp Ile
          35             40             45

Gly Arg Leu Asp Pro Asn Ser Gly Glu Thr Lys Tyr Asn Lys Phe Lys
 50             55             60

Lys Ser Lys Ala Thr Leu Thr Val Asp Lys Pro Ser Ser Thr Ala Tyr
 65             70             75             80

Met Glu Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys
          85             90             95

Ala Arg Glu Ala Tyr Gly Tyr Trp Asn Phe Asp Val Trp Gly Thr Gly
          100             105             110

Thr Thr Val Thr Val Ser Ser

```



<210> 75  
 <211> 107  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: BoNT/A clone  
 C15 region VL epitope 1

<400> 75  
 Asp Ile Glu Leu Thr Gln Ser Pro Ala Ile Met Ser Ala Ser Pro Gly  
   1                  5                  10                  15  
 Glu Lys Val Ile Met Thr Cys Ser Ala Ser Ser Ser Val Ser His Met  
                   20                  25                  30  
 Tyr Trp Tyr Gln Gln Lys Pro Gly Ser Ser Pro Arg Leu Leu Ile Tyr  
           35                  40                  45  
 Asp Thr Ser Asn Leu Ala Ser Gly Val Pro Ile Arg Phe Ser Gly Ser  
   50                  55                  60  
 Gly Ser Gly Thr Ser Tyr Ser Leu Thr Ile Ser Arg Met Glu Ala Glu  
   65                  70                  75                  80  
 Asp Ser Ala Thr Tyr Tyr Cys Gln Gln Trp Ser Ser Tyr Pro Phe Thr  
                   85                  90                  95  
 Phe Gly Ser Gly Thr Lys Leu Glu Leu Lys Arg  
           100                  105

<210> 76  
 <211> 107  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: BoNT/A clone  
 C9 region VL epitope 1

<400> 76  
 Asp Ile Asp Leu Thr Gln Ser Pro Ala Ile Met Ser Ser Ser Pro Gly  
   1                  5                  10                  15  
 Glu Lys Val Ile Ile Thr Cys Ser Ala Ser Ser Ser Val Ser Tyr Met  
                   20                  25                  30  
 His Trp Phe Gln Gln Lys Pro Gly Thr Ser Pro Lys Pro Trp Ile Tyr  
   35                  40                  45  
 Ser Thr Ser Asn Leu Ala Ser Gly Val Pro Ala Arg Phe Ser Gly Ser  
   50                  55                  60  
 Gly Ser Gly Thr Ser Tyr Ser Leu Thr Ile Ser Ser Val Glu Ala Glu  
   65                  70                  75                  80  
 Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Tyr Ser Gly Tyr Pro Leu Thr

85

90

95

Phe Gly Ala Gly Thr Lys Leu Glu Ile Lys Arg  
 100 105

&lt;210&gt; 77

&lt;211&gt; 109

&lt;212&gt; PRT

&lt;213&gt; Artificial Sequence

&lt;220&gt;

<223> Description of Artificial Sequence: BoNT/A clone  
 1D5 region VL epitope 1

&lt;400&gt; 77

Asp Ile Glu Leu Thr Gln Ser Pro Ala Ile Met Ala Ala Ser Pro Gly  
 1 5 10 15

Glu Lys Val Ile Ile Thr Cys Ser Ala Ser Ser Ser Ile Ser Ser Ser  
 20 25 30

Asn Leu His Trp Tyr Gln Gln Lys Ser Glu Thr Ser Pro Lys Pro Trp  
 35 40 45

Ile Tyr Gly Thr Ser Asn Leu Ala Ser Gly Val Pro Val Arg Phe Ser  
 50 55 60

Gly Ser Gly Ser Gly Thr Ser Tyr Ser Leu Thr Ile Ser Ser Met Glu  
 65 70 75 80

Ala Glu Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Trp Gly Ser Tyr Pro  
 85 90 95

Leu Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys Arg  
 100 105

&lt;210&gt; 78

&lt;211&gt; 107

&lt;212&gt; PRT

&lt;213&gt; Artificial Sequence

&lt;220&gt;

<223> Description of Artificial Sequence: BoNT/A clone  
 C1 region VL epitope 1

&lt;400&gt; 78

Asp Ile Glu Leu Thr Gln Ser Pro Ala Ile Met Ser Ala Ser Pro Gly  
 1 5 10 15

Glu Lys Val Ile Met Thr Cys Ser Ala Ser Ser Ser Val Ser Tyr Met  
 20 25 30

Tyr Trp Tyr Gln Gln Lys Pro Gly Ser Ser Pro Arg Leu Leu Ile Tyr  
 35 40 45

Asp Thr Ser Asn Leu Ala Ser Gly Val Pro Val Arg Phe Ser Gly Ser  
 50 55 60

Gly Ser Gly Thr Ser Tyr Ser Leu Thr Ile Ser Arg Met Glu Ala Glu

65	70	75	80
Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Trp Ser Ser Tyr Pro Leu Thr			
85		90	95

Phe Gly Ala Gly Thr Lys Leu Glu Leu Lys Arg
100 105

<210> 79  
 <211> 109  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: BoNT/A clone  
 S25 region VL epitope 1

<400> 79
Asp Ile Glu Leu Thr Gln Ser Pro Ala Leu Met Ala Ala Ser Pro Gly
1 5 10 15

Glu Lys Val Ile Ile Thr Cys Ser Val Ser Ser Ser Ile Ser Ser Ser
20 25 30

Asn Leu His Trp Tyr Gln Gln Lys Ser Gly Thr Ser Pro Lys Pro Trp
35 40 45

Ile Tyr Gly Thr Ser Asn Leu Ala Ser Gly Val Pro Val Arg Phe Ser
50 55 60

Gly Ser Gly Ser Gly Thr Ser Tyr Ser Leu Thr Ile Ser Ser Met Glu
65 70 75 80

Ala Glu Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Trp Ser Ser Tyr Pro
85 90 95

Leu Thr Phe Gly Ala Gly Thr Lys Leu Glu Ile Lys Arg
100 105

<210> 80  
 <211> 112  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: BoNT/A clone  
 1B6 region VL epitope 1

<400> 80
Asp Ile Glu Leu Thr Gln Ser Pro Ala Ser Leu Ala Val Ser Leu Gly
1 5 10 15

Gln Arg Ala Ile Ile Ser Cys Arg Ala Ser Glu Ser Val Asp Ser Tyr
20 25 30

Gly Asn Ser Phe Met His Trp Tyr Gln Gln Lys Pro Gly Gln Pro Pro
35 40 45

Lys Leu Leu Ile Tyr Arg Ala Ser Asn Leu Glu Ser Gly Ile Pro Ala
---

50		55		60
Arg Phe Ser Gly Ser Gly Ser Arg Thr Asp Phe Thr Leu Thr Ile Asn				
65		70		75
Pro Val Glu Ala Asp Asp Val Ala Thr Tyr Tyr Cys Gln Gln Ser Asn				
	85		90	95
Glu Asp Pro Pro Thr Phe Gly Ala Gly Thr Lys Leu Glu Leu Lys Arg				
	100		105	110

<210> 81  
 <211> 112  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: BoNT/A clone  
 1C9 region VL epitope 1

<400> 81
Asp Ile Glu Leu Thr Gln Ser Pro Ala Ser Leu Ala Val Ser Leu Gly
1 5 10 15
Gln Arg Ala Ile Ile Ser Cys Arg Ala Ser Glu Ser Val Asp Ser Tyr
20 25 30
Gly Asn Ser Phe Met His Trp Tyr Gln Gln Lys Pro Gly Gln Pro Pro
35 40 45
Lys Leu Leu Ile Tyr Arg Ala Ser Asn Leu Glu Ser Gly Ile Pro Ala
50 55 60
Arg Phe Ser Gly Ser Gly Ser Arg Thr Asp Phe Thr Leu Thr Ile Asn
65 70 75 80
Pro Val Glu Ala Asp Asp Val Ala Thr Tyr Tyr Cys Gln Gln Ser Asn
85 90 95
Glu Asp Pro Tyr Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys Arg
100 105 110

<210> 82  
 <211> 107  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: BoNT/A clone  
 1E8 region VL epitope 1

<400> 82
Asp Ile Glu Leu Thr Gln Ser Pro Ala Ile Met Ser Ala Ser Pro Gly

1	5	10	15
Glu Lys Val	Ile Met Thr Cys Ser Ala	Ser Ser Ser Val	Ser Tyr Met
20	25	30	
His Trp Tyr	Gln Gln Lys Ser Gly Thr	Ser Pro Lys Arg	Trp Ile Tyr
35	40	45	
Asp Thr Ser	Lys Leu Ala Ser Gly Val	Pro Ala Arg Phe	Ser Gly Ser
50	55	60	
Gly Ser Gly	Thr Ser Tyr Ser Leu Thr	Ile Ser Ser Met	Glu Ala Glu
65	70	75	80
Asp Ala Ala	Thr Tyr Tyr Cys Gln Gln	Trp Ser Ser Asn	Pro Leu Thr
85	90	95	
Phe Gly Ala	Gly Thr Lys Leu Glu	Leu Lys Arg	
100	105		

<210> 83  
 <211> 107  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: BoNT/A clone  
 1G7 region VL epitope 1

<400> 83
Asp Ile Glu Leu Thr Gln Ser Pro Ala Ile Met Ser Ala Ser Pro Gly
1 5 10 15
Glu Lys Val Ile Met Thr Cys Ser Ala Ser Ser Ser Val Ser Tyr Met
20 25 30
His Trp Tyr Gln Gln Lys Ser Gly Thr Ser Pro Lys Arg Trp Ile Tyr
35 40 45
Asp Thr Ser Lys Leu Ala Ser Gly Val Pro Ala Arg Phe Ser Gly Ser
50 55 60
Gly Ser Gly Thr Ser Tyr Ser Leu Thr Ile Ser Ser Met Glu Ala Glu
65 70 75 80
Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Trp Ser Ser Asn Pro Leu Thr
85 90 95
Phe Gly Ala Gly Thr Lys Leu Glu Leu Lys Arg
100 105

<210> 84  
 <211> 112  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: BoNT/A clone  
 1A1 region VL epitope 2

<400> 84

Asp Ile Glu Leu Thr Gln Ser Pro Ala Ser Leu Ala Val Ser Leu Gly  
1 5 10 15  
Gln Arg Ala Thr Ile Ser Cys Arg Ala Ser Glu Ser Val Asp Ser Tyr  
20 25 30  
Gly Asn Ser Phe Met His Trp Tyr Gln Gln Lys Pro Gly Gln Pro Pro  
35 40 45  
Lys Leu Leu Ile Tyr Leu Ala Ser Asn Leu Glu Ser Gly Val Pro Ala  
50 55 60  
Arg Phe Ser Gly Ser Gly Ser Arg Thr Asp Phe Thr Leu Thr Ile Asp  
65 70 75 80  
Pro Val Glu Ala Asp Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Asn Asn  
85 90 95  
Glu Asp Pro Tyr Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys Arg  
100 105 110

<210> 85

<211> 112

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: BoNT/A clone  
1F1 region VL epitope 2

<400> 85

Asp Ile Glu Leu Thr Gln Ser Pro Thr Ser Leu Ala Val Ser Leu Gly  
1 5 10 15  
Gln Arg Ala Thr Ile Ser Cys Arg Ala Ser Glu Ser Val Asp Ser Tyr  
20 25 30  
Gly Asn Ser Phe Met His Trp Tyr Gln Gln Lys Pro Gly Gln Pro Pro  
35 40 45  
Lys Leu Leu Ile Tyr Leu Ala Ser Asn Leu Glu Ser Gly Val Pro Ala  
50 55 60  
Arg Phe Ser Gly Ser Gly Ser Arg Thr Asp Phe Thr Leu Thr Ile Asp  
65 70 75 80  
Pro Val Glu Ala Asp Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Asn Asn  
85 90 95  
Glu Asp Pro Tyr Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys Arg  
100 105 110

<210> 86  
 <211> 112  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: BoNT/A clone  
 C39 region VL epitope 2

<400> 86  
 Asp Ile Glu Leu Thr Gln Ser Pro Ala Ser Leu Ala Val Ser Leu Gly  
   1                  5                  10                  15  
 Arg Arg Ala Thr Ile Ser Cys Arg Ala Ser Glu Ser Val Asp Ser Tyr  
           20                  25                  30  
 Gly His Ser Phe Met His Trp Tyr Gln Gln Lys Pro Gly Gln Pro Pro  
           35                  40                  45  
 Lys Leu Leu Ile Tyr Leu Ala Ser Asn Leu Glu Ser Gly Val Pro Ala  
   50                  55                  60  
 Arg Phe Ser Gly Ser Gly Ser Arg Thr Asp Phe Thr Leu Thr Ile Asp  
   65                  70                  75                  80  
 Pro Val Glu Ala Asp Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Asn Asn  
           85                  90                  95  
 Glu Asp Pro Tyr Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys Arg  
       100                  105                  110

<210> 87  
 <211> 112  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: BoNT/A clone  
 C25 region VL epitope 2

<400> 87  
 Asp Ile Glu Leu Thr Gln Ser Pro Ala Ser Leu Ala Val Ser Leu Gly  
   1                  5                  10                  15  
 Gln Arg Ala Thr Ile Ser Cys Arg Ala Ser Glu Ser Val Asp Ser Tyr  
           20                  25                  30  
 Gly His Ser Phe Met Gln Trp Tyr Gln Gln Lys Pro Gly Gln Pro Pro  
           35                  40                  45  
 Lys Leu Leu Ile Tyr Arg Ala Ser Asn Leu Glu Pro Gly Ile Pro Ala  
   50                  55                  60  
 Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Asn  
   65                  70                  75                  80

Pro Val Glu Ala Asp Asp Val Ala Thr Tyr Tyr Cys Gln Gln Ser Asn  
85 90 95

Glu Asp Pro Phe Thr Phe Gly Ser Gly Thr Lys Leu Glu Ile Lys Arg  
100 105 110

<210> 88  
<211> 107  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: BoNT/a clone  
2G5 region VL epitope 2

<400> 88  
Asp Ile Glu Leu Thr Gln Ser Pro Ala Ile Met Ser Ala Ser Pro Gly  
1 5 10 15  
Glu Lys Val Thr Thr Thr Cys Ser Ala Ser Ser Ser Val Ser Tyr Met  
20 25 30  
His Trp Phe Gln Gln Lys Pro Gly Thr Ser Pro Lys Leu Trp Ile Tyr  
35 40 45  
Ser Thr Ser Asn Leu Ala Ser Gly Val Pro Ala Arg Phe Ser Gly Ser  
50 55 60  
Gly Ser Gly Thr Ser Tyr Ser Leu Thr Ile Ser Arg Met Glu Ala Glu  
65 70 75 80  
Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Arg Ser Ser Tyr Pro Tyr Thr  
85 90 95  
Phe Gly Gly Gly Asp Gln Ala Gly Asn Lys Ser  
100 105

<210> 89  
<211> 112  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: BoNT/A clone  
3C3 region VL epitope 2

<400> 89  
Asp Ile Glu Leu Thr Gln Ser Pro Ala Ile Met Ser Ala Ser Pro Gly  
1 5 10 15  
Glu Lys Val Thr Thr Thr Cys Arg Ala Ser Glu Ser Val Asp Ser Tyr  
20 25 30  
Gly His Ser Phe Met Gln Trp Phe Gln Gln Lys Pro Gly Thr Ser Pro  
35 40 45



Lys Leu Trp Ile Tyr Ser Thr Ser Asn Leu Ala Ser Gly Val Pro Ala  
     50                    55                    60  
 Arg Phe Ser Gly Ser Gly Ser Gly Thr Ser Tyr Ser Leu Thr Ile Ser  
     65                    70                    75                    80  
 Arg Met Glu Ala Glu Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Arg Ser  
                     85                    90                    95  
 Ser Tyr Pro Tyr Thr Phe Gly Gly Gly Asp Gln Ala Gly Asn Lys Arg  
                     100                    105                    110

<210> 90  
 <211> 107  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: BoNT/A clone  
         3F4 region VL epitope 2

<400> 90  
 Asp Thr Glu Leu Thr Gln Ser Pro Ala Ile Met Ser Ala Ser Pro Gly  
     1                    5                    10                    15  
 Glu Lys Val Thr Met Thr Cys Ser Ala Ser Ser Ser Val Ser Tyr Met  
                     20                    25                    30  
 Tyr Trp Tyr Gln Gln Lys Pro Gly Ser Ser Pro Arg Leu Trp Ile Tyr  
                     35                    40                    45  
 Asp Thr Ser Asn Leu Ala Ser Gly Val Pro Val Arg Phe Ser Gly Ser  
     50                    55                    60  
 Gly Ser Gly Thr Ser Tyr Ser Leu Thr Ile Ser Arg Met Glu Ala Glu  
     65                    70                    75                    80  
 Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Trp Ser Ser Tyr Pro Pro Thr  
                     85                    90                    95  
 Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys Arg  
                     100                    105

<210> 91  
 <211> 109  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: BoNT/A clone  
         3H4 region VL epitope 2

<400> 91  
 Asp Ile Glu Leu Thr Gln Ser Pro Ala Ile Met Ser Ala Ser Pro Gly  
     1                    5                    10                    15

Glu Lys Val Thr Met Thr Cys Arg Ala Ser Ser Ser Val Ser Ser Ser  
           20                          25                          30  
 Tyr Leu Gln Trp Tyr Gln Gln Lys Pro Gly Ser Ser Pro Arg Leu Trp  
           35                          40                          45  
 Ile Tyr Asp Thr Ser Asn Leu Ala Ser Gly Val Pro Val Arg Phe Ser  
           50                          55                          60  
 Gly Ser Gly Ser Gly Thr Ser Tyr Ser Leu Thr Ile Ser Arg Met Glu  
           65                          70                          75                          80  
 Ala Glu Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Trp Ser Ser Tyr Pro  
                           85                          90                          95  
 Pro Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys Arg  
           100                          105

<210> 92  
 <211> 109  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: BoNT/A clone  
           1B3 region VL epitope 3

<400> 92  
 Asp Ser Glu Leu Thr Gln Ser Pro Thr Thr Met Ala Ala Ser Pro Gly  
   1                          5                          10                          15  
 Glu Lys Ile Thr Thr Thr Cys Ser Ala Ser Ser Ser Ile Ser Ser Asn  
           20                          25                          30  
 Tyr Leu His Trp Tyr Gln Gln Arg Pro Gly Phe Ser Pro Lys Leu Leu  
           35                          40                          45  
 Ile Tyr Arg Thr Ser Asn Leu Ala Ser Gly Val Pro Ala Arg Phe Ser  
           50                          55                          60  
 Gly Ser Gly Ser Gly Thr Ser Tyr Ser Leu Thr Ile Gly Thr Met Glu  
           65                          70                          75                          80  
 Ala Glu Asp Val Ala Thr Tyr Tyr Cys Gln Gln Gly Ser Ser Ile Pro  
                           85                          90                          95  
 Arg Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys Arg  
           100                          105

<210> 93  
 <211> 111  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: BoNT/A clone  
           1C6 region VL epitope 3

<400> 93

Asp Ile Glu Leu Thr Gln Ser Pro Ala Ser Leu Ala Val Ser Leu Gly  
 1 5 10 15  
 Arg Arg Ala Thr Thr Ser Cys Arg Ala Ser Glu Ser Val Glu Tyr Tyr  
 20 25 30  
 Gly Thr Ser Leu Met Gln Trp Tyr Gln Gln Lys Pro Gly Gln Pro Pro  
 35 40 45  
 Lys Leu Leu Ile Tyr Ala Ala Ser Asn Val Glu Ser Gly Val Pro Ala  
 50 55 60  
 Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Ser Leu Asn Ile His  
 65 70 75 80  
 Pro Val Glu Glu Asp Ile Ala Met Tyr Phe Cys Gln Gln Ser Arg Lys  
 85 90 95  
 Val Pro Trp Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys Arg  
 100 105 110

<210> 94

<211> 112

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: BoNT/A clone  
2B6 region VL epitope 3

<400> 94

Tyr Ile Glu Leu Thr Gln Ser Pro Ala Ser Leu Ala Val Ser Leu Gly  
 1 5 10 15  
 Gln Arg Ala Thr Thr Ser Cys Arg Ala Ser Glu Ser Val Asp Ser Tyr  
 20 25 30  
 Gly Asn Ser Phe Met His Trp Tyr Gln Gln Lys Pro Gly Gln Pro Pro  
 35 40 45  
 Lys Leu Leu Ile Tyr Leu Ala Ser Asn Leu Glu Ser Gly Val Pro Ala  
 50 55 60  
 Arg Phe Ser Gly Ser Gly Ser Arg Thr Asp Phe Thr Leu Thr Ile Asp  
 65 70 75 80  
 Pro Val Glu Ala Glu Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Asn Asn  
 85 90 95  
 Glu Asp Pro Tyr Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys Ser  
 100 105 110

<210> 95

<211> 112

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: BoNT/A clone  
1G5 region VL epitope 3

<400> 95

Asp Ile Glu Leu Thr Gln Ser Pro Ala Ser Leu Ala Val Ser Leu Gly  
1 5 10 15

Gln Arg Ala Thr Thr Ser Cys Arg Ala Ser Glu Ser Val Glu Tyr Tyr  
20 25 30

Gly Thr Ser Leu Met Gln Trp Tyr Gln Gln Lys Pro Gly Gln Pro Pro  
35 40 45

Lys Leu Leu Ile Tyr Ala Ala Ser Asn Val Glu Ser Gly Ala Pro Ala  
50 55 60

Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Ser Leu Asn Ile His  
65 70 75 80

Pro Val Glu Glu Asp Asp Ile Ala Met Tyr Phe Cys Gln Gln Ser Arg  
85 90 95

Lys Val Pro Tyr Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys Arg  
100 105 110

<210> 96

<211> 109

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: BoNT/A clone  
1H6 region VL epitope 3

<400> 96

Asp Ile Glu Leu Thr Gln Ser Pro Ala Ile Met Ser Ala Ser Pro Gly  
1 5 10 15

Glu Lys Val Thr Thr Thr Cys Ser Val Ser Ser Ser Ile Ser Ser Ser  
20 25 30

Asn Leu His Trp Tyr Gln Gln Lys Ser Gly Thr Ser Pro Lys Leu Trp  
35 40 45

Ile Tyr Gly Thr Ser Asn Leu Ala Ser Gly Val Pro Val Arg Phe Ser  
50 55 60

Gly Ser Gly Ser Gly Thr Ser Tyr Ser Leu Thr Ile Ser Ser Met Glu  
65 70 75 80

Ala Glu Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Trp Ser Ser Tyr Pro  
85 90 95

Leu Thr Phe Gly Ala Gly Thr Lys Val Glu Leu Arg Arg  
100 105

<210> 97  
 <211> 109  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: BoNT/A clone  
 1F3 region VL epitope 4

<400> 97  
 Asp Ile Glu Leu Thr Gln Ser Pro Ala Ser Met Ser Ala Ser Pro Gly  
 1 5 10 15  
 Glu Lys Val Thr Met Thr Cys Arg Ala Thr Ser Ser Val Ser Ser Ser  
 20 25 30  
 Tyr Leu His Trp Tyr Gln Gln Lys Ser Gly Ala Ser Pro Lys Leu Trp  
 35 40 45  
 Ile Tyr Ser Ala Ser Asn Leu Ala Ser Gly Val Pro Ser Arg Phe Ser  
 50 55 60  
 Gly Ser Gly Ser Gly Thr Ser Tyr Ser Leu Thr Ile Ser Ser Val Glu  
 65 70 75 80  
 Ala Glu Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Tyr Ile Gly Tyr Pro  
 85 90 95  
 Tyr Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys Arg  
 100 105

<210> 98  
 <211> 109  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: BoNT/A clone  
 2E8 region VL epitope 4

<400> 98  
 Asp Ile Glu Leu Thr Gln Ser Pro Thr Thr Met Ala Ala Ser Pro Gly  
 1 5 10 15  
 Glu Lys Ile Thr Ile Thr Cys Ser Ala Ser Ser Ser Ile Gly Ser Asn  
 20 25 30  
 Tyr Leu His Trp Tyr Gln Gln Lys Pro Gly Phe Ser Pro Lys Leu Leu  
 35 40 45  
 Ile Tyr Arg Thr Ser Asn Leu Ala Ser Gly Val Pro Ala Arg Phe Ser  
 50 55 60  
 Gly Ser Gly Ser Gly Thr Ser Tyr Ser Leu Thr Ile Gly Ala Met Glu  
 65 70 75 80  
 Ala Glu Asp Val Ala Thr Tyr Tyr Cys Gln Gln Gly Ser Ser Ile Pro  
 85 90 95

Tyr Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys Arg  
100 105

A3  
cont